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PUBLIC SAFETY

Use and Safety of Atom

➤ THE CONFLICT between the Atomic Energy Commission's regulatory responsibilities involving health and safety and its development of use of atomic energy has come to a head. The problem is one of concern to the new Administration.

The AEC has been criticized, on the one hand, for allowing safety considerations to unnecessarily impede industrial atomic development. It also has been attacked for placing safety factors second to development goals and thereby endangering the public health.

This paradox is a natural consequence of allowing one agency to control both regulation and development; and a reorganization of the AEC now appears imminent.

It has been the subject of four separate major studies by the AEC, the Joint Congressional Committee on Atomic Energy, the University of Michigan Law School and the Brookings Institution.

The AEC plan, now completed, appears to have the backing of President Kennedy.

When asked by SCIENCE SERVICE to give his views on the Michigan recommendations President Kennedy said that members of the Atomic Energy Commission agree that there should be some external check on their research and development program. He added, "I think that there is a fair balance today." He pointed out that the subject was discussed when he visited the Atomic Energy Commission in Germantown, Md.

The AEC study recommends that all regulatory functions now under the general manager be placed under a director of regulation, reporting directly to the five-man AEC. The present division of licensing and regulation and division of compliance, now under the authority of the general manager, would be placed under the new director of regulation. The compliance division would become an office of inspection and have a section of health and safety for regulatory duties.

The Brookings study is not yet completed. The extensive four-part review of the problem by Michigan Law School has recommended that the AEC be split into two agencies. An Atomic Energy Board would assume present safety regulatory functions of the AEC, including rulemaking and deciding licensing cases. An Atomic Energy Administration, headed by a single executive rather than the present five-member Commission, would be responsible for conducting the AEC's operational, development and promotional functions.

The split could increase public confidence in the operations of the atomic energy industry while, at the same time, the industry would benefit from a regulatory system that is not unduly burdensome, the Michigan study claims. Its authors are Lee Hydeman and William Berman, both former AEC attorneys.

The Joint Committee recommendations would create a three-man licensing board to operate within the AEC, its functions limited solely to regulations of health and safety involved in licensing. It would have no police powers to enforce compliance with its regulations, however, once the license was granted.

The members of the licensing board, men of high technical ability to be appointed by the President, would conduct reactor-licensing hearings and decide cases.

The five-man Commission would retain rule-making and policy functions but would look to the licensing board for recommendations on rules.

All proposals undoubtedly will receive Congressional attention in the coming weeks, and predictions are that unless the Administration changes its position, the AEC recommended modifications will stand.

• Science News Letter, 79:194 April 1, 1961

ROCKETS AND MISSILES

Stable Rocket Can Go Far With the Right Attitude

➤ ROCKETS, like people, need the right "attitude" and "stability" to push ahead and achieve success. With the right amount of both, however, "the sky is the limit," literally for rockets.

The attitude and stabilizing system of an Aerobee 150A sounding rocket will be put to the test soon from Wallops Station, Va.

If the rocket's attitude is right and sufficient stability is demonstrated, the two-stage Aerobee will become an important test vehicle for designing and developing experiments and instruments for an Orbiting Astronomical Observatory (OAO) to study the universe.

The Aerobee is one of the mainstays in the extensive sounding rocket program of the National Aeronautics and Space Administration's Goddard Space Flight Center.

The spinning motion of sounding rockets without attitude or pointing control systems prevents astronomical instruments from being pointed at celestial objects long enough to obtain needed information.

To be launched in a near vertical trajectory, the Aerobee 150A is planned to reach a maximum velocity of 6,100 feet per second, and take its 195-pound payload to an altitude of 134 statute miles.

Besides testing the new system, the Aerobee will carry two scientific experiments to measure energies in space. The first is a detector to obtain data on the energy and distribution of gamma rays in the 0.1 and 1.5 MEV (million electron volts) range. The second will measure solar flux or energy from the sun in two spectral regions. The latter experiment depends on the rocket control system to aim two experimental sensors at the sun.

The rocket attitude system basically is a gyroscope that will permit programming of as many as five different targets in space per flight.

Developed by Aerojet-General Corporation, the 44.4-pound attitude control system will be test-checked by a tracking solar sensing system of Ball Brothers Research Corporation of Boulder, Colo.

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TECHNOLOGY

Computers Imitate People

➤ COMPUTERS can now be programmed to solve problems in basically the same way that children apparently learn to speak and business men commonly make decisions, Prof. Herbert A. Simon of the Carnegie Institute of Technology declared in a lecture at the Massachusetts Institute of Technology, Cambridge, Mass.

A first approximation of "the hierarchy of final causes traditionally called the mind" has been reached, he said in describing a computer program called the General Problem Solver.

Living organisms, he argued, survive by associating appropriate perceptual symbols with motor symbols. The former describe the world as it is and the latter describe actions. Men solve their problems by finding correspondences between the symbols that constitute these internal languages, he said, and the system of methods they use is now being simulated in computers.

"Most of our skill in dealing with the environment," he said, "is embodied in elaborate heuristics, or rules of thumb, that allow us to factor (approximately) the complex perceived world into highly simple components and to find (approximately and reasonably reliably) the correspondences that allow us to act on the world predictably. . . .

"Computer programs can be written that use non-numerical symbol-manipulating processes to perform tasks which, in humans, require thinking and learning. These programs can be regarded as theories, in a completely literal sense, of the corresponding human processes. . . .

"A dozen or more computer programs have been written and tested that perform some of the interesting symbol-manipulating, problem-solving talks that humans can perform, and that do so in a manner which simulates, at least in some general respects, the way in which humans do these tasks."

Prof. Simon is associate dean of the graduate school of industrial management at the Carnegie Institute of Technology. His lecture was one of a series on "Management and the Computer of the Future," being given to celebrate MIT's centennial. The MIT's school of industrial management arranged the series of discussions of computer potentialities with the help of a grant from the International Business Machines Corporation.

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MEDICINE

Cancer Cure Sought

Methotrexate is among the most successful anti-cancer drugs so far found in the $100,000,000 push to save millions of lives in the future, Faye Marley reports.

▶ THE DRUGS that can cure cancer may be hidden among the 160 or more that medical research is now actually using in treating patients with human cancer by clinical trials.

No one knows just what drugs may be successful—some of the compounds have not even been named—but the leading researchers on one of the world's great killers are confident they are on the right track.

So far, the great hope for those who have any form of this disease today is still, as all cancer advice tells, early detection, surgery and radiation. Cancer is not a completely hopeless disease, for 50% of the cases could be cured if patients got to physicians fast enough. Actually, 35% is the cure rate for curable cancer. There are, however, still many cancers that are hopeless from the time of their discovery.

Surgery and radiation have been used for treating and sometimes curing thousands of people in the United States, but these methods are frequently not effective against cancer that has spread to other parts of the body (metastasized), or against leukemia, cancer of the blood.

The treatment of such disseminated cancer is the major problem in cancer treatment, and it is here that chemotherapy gives hope.

Treatment with drugs that can reach and destroy malignant cells wherever they may be in the body has been at least temporarily effective against some 30 forms of cancer.

Dr. Stuart M. Sessoms, associate director for chemotherapy, National Cancer Institute, Bethesda, Md., told SCIENCE SERVICE that one of the promising drugs is methotrexate, which has been used at the Institute for a number of years. Its primary use is against leukemia.

"This is the nearest thing to a cure that we can show," he said. Dr. Roy Hertz, chief of the Institute's endocrinology branch, has used methotrexate in treating a number of women patients with choriocarcinoma, a rare cancer that occurs in the placental tissues during the process of childbearing.

Dr. Hertz is a world authority on choriocarcinoma. More than five years have passed since he and his colleagues reported the first successful use of methotrexate to suppress this disease. Some of his choriocarcinoma patients have shown no return of the cancer since 1955.

Methotrexate was first synthesized in 1947 by Dr. Subba Row, now dead, when he was director of research for Lederle Laboratories, Pearl River, N. Y., working with others. Aiding in methotrexate research was Dr. Sidney Farber of Children's Medical Center, Boston, who acted as Lederle consultant and did the clinical tests in Boston.

Dr. Robert D. Sullivan of the Sloan-Kettering Institute for Cancer Research and Memorial Hospital, New York, has combined methotrexate with treatment at the same time by an antidote called leucovorin.

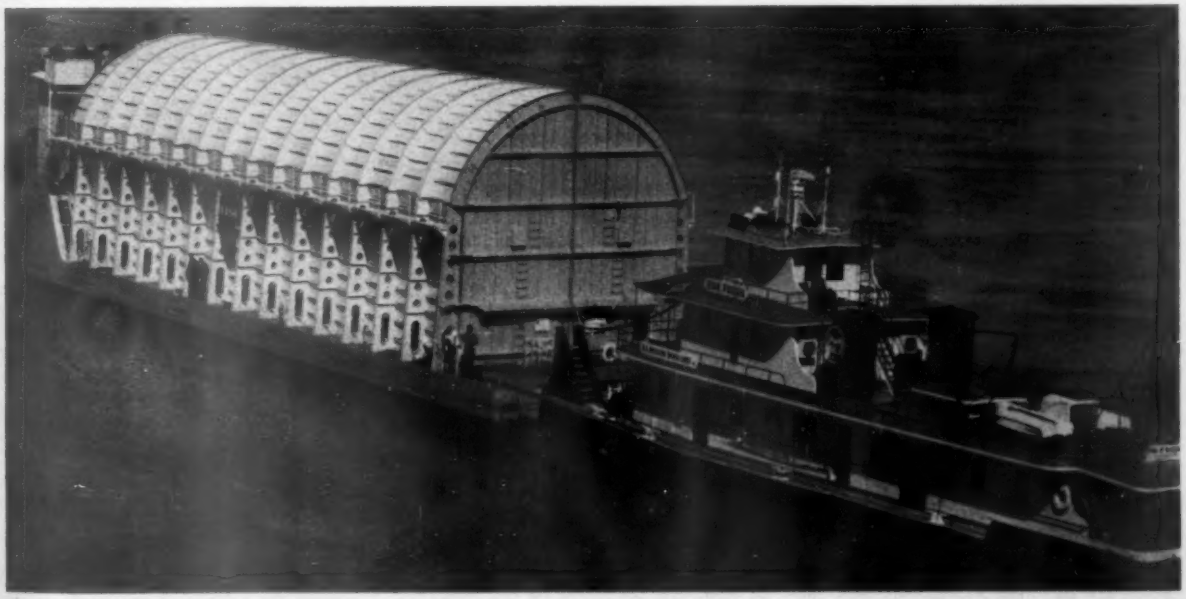
First tried in New York, leucovorin is now being tested along with methotrexate in Kenya, Africa, where cancer patients have had no previous treatment with surgery and radiation. Sloan-Kettering with the African Research Foundation is continuing work Dr. Sullivan began with 24 African patients.

Leucovorin is a derivative of folic acid and is a potent enemy of aminopterin and other folic acid antagonists such as methotrexate.

The reason for giving the antidote is that methotrexate is being injected into the arteries at about ten times the lethal dose ordinarily given for leukemia. At the the same time, leucovorin is being injected intramuscularly every six hours to prevent damage to bone marrow.

Dr. Sullivan and his colleagues two years ago first treated patients with cancer in the head, sinus and cervix, but they are further exploring liver and brain cancer treatment by injecting methotrexate into the hepatic and internal carotid arteries, while at the same time they inject leucovorin intramuscularly.

One 72-year-old man who was treated



SPACE-AGE BARGE—The 180-foot Palaemon barge hauls the first Saturn static-test booster down the Tennessee River to study the stresses the rocket will be subjected to during its 2,200-mile trip to Cape Canaveral, Fla. The barge will carry the first and second stages of the Saturn space vehicle to the Cape.

with the original 18 patients at the New York Veterans Administration Hospital is still alive and tumors have regressed in other patients.

No competent investigator with a real idea for cancer treatment need go without funds for research. The National Cancer Institute estimates that more than $100,000,000 is presently being spent for research throughout the United States in attempts to find cures for cancer.

Many university medical centers are adding cancer research to their programs. Funds for a new Eleanor Roosevelt Institute for Cancer Research have just been made available to the University of Colorado Medical Center at Boulder. For research alone and to defray expenses of hospitalized cancer patients, who cannot pay for treatment, $300,000 is provided.

No one drug can cure all the 30 major types of cancer. Many of the 160 drugs being tested on human beings after extensive animal experiments and screening will have to be discarded because of side effects or for other reasons, but many of them will give and are giving at least temporary relief and are causing regression. All are lethal poisons and must be administered with the greatest care.

In addition to the drugs already mentioned, there are some 20 or more in use by physicians treating cancer patients. Among those that have been used with beneficial effect, sometimes in connection with X-ray treatments, are:

Chlorambucil, 6-mercaptopurine, nitrogen mustard, myeleran, urethane, thio-TEPA, TEM, male or female sex hormones, cortisone, hydrocortisone, prednisone, prednisolone and ACTH. VLB, or Velban, is a new drug produced by Eli Lilly and Company. Cytoxan and Actinomycin D, an antibiotic, are also comparatively recent.

Orthoparaprime DDD, not available commercially, is at present being tested by the NIH's Cancer Chemotherapy National Service Center for a rare type of cancer, adrenal carcinoma. This drug is specific for tissue of the adrenal cortex.

In the eagerness of some researchers to find cancer cures, more hope can be held out than is warranted. This may be true of sarcolysin, a drug used in Russia and in Britain since its synthesis in 1953. Sarcolysin is a nitrogen mustard, but is in marked contrast to other nitrogen mustards, which have been effective in treatment of leukemia and Hodgkin's disease.

Sarcolysin has been effective on some solid tumors, including seminoma, reticulum cell sarcoma, Ewing's tumor (a bone tumor) and thymoma. The Russian and British physicians who have used sarcolysin say that these tumors have completely regressed, but U. S. cancer specialists believe the reports are exaggerated.

Thousands of substances are being tested on animals before they are considered fit for experiment with human beings. New drugs are being compounded constantly in the hope that some will be found that are more promising than any found so far.

Scientists are always cautious about using the term "cure." But this does not mean that cure is beyond the realm of scientific achievement.

Some causes of cancer are known—among them being radiation and chemicals in the dye industry—but the most hopeful field of research, into the relationship of virus to cancer, may give the chemotherapists a more specific primary agent to fight.

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GENERAL SCIENCE

Key to World Peace

➤ WORLD PEACE now depends largely on the success of the East-West three-power talks on nuclear testing under way in Geneva.

Failure to reach a test-ban agreement would mean, at the very least, a step-up in the cold war as well as resumption of of nuclear testing and subsequent contamination from radioactive fallout of the earth and its atmosphere.

Other more serious consequences are a dangerous East-West nuclear arms race and the spread of nuclear weapons to less stable governments capable of triggering a hot war.

While a time-limit has not been set on present negotiations, there is considerable pressure from both Administration and Congressional leaders to abandon negotiations if no agreement is reached by the end of summer.

The United Kingdom and the United States are resuming negotiations with the Soviet Union after a thorough review of the Western position on a nuclear test ban. The Western powers are reportedly prepared to make concessions on certain vital issues, and they may take the initiative in offering them to the Russians.

Dr. Jerome Wiesner, Science Adviser to President Kennedy, said that he believes an agreement is possible if both sides are willing to make concessions.

At this point in the negotiations, the United States is believed to have superior nuclear power; so any yielding by the West will be made from a position of strength that could not possibly be interpreted as a mark of surrender, leaders here point out.

But although the atmosphere is hopeful, there is a growing conviction the inconclusive negotiations that have marked the past 27 months of meetings now must be terminated.

Sen. Clinton P. Anderson (D.-N.M.), past chairman of the Joint Congressional Committee on Atomic Energy, applauded the willingness of the Kennedy Administration to make a strong, concerted effort to reach an East-West agreement on this important issue

"I hope the present talks will bring about clear knowledge of whether we will or will not be able to negotiate fruitfully with the Russians," he told SCIENCE SERVICE. "In the past, the Russians have said they wanted suspension without inspection."

Inspection is the key to any agreement that will be acceptable to the West, he said. And if the Russians are not willing to negotiate affirmatively on this point, then further talks with them can have no meaning.

Although Sen. Anderson is opposed to indefinite negotiation he does not believe that the two and a half year moratorium on testing in this country has impaired our nuclear strength.

It has not impaired exploitation of natural resources by means of underground nuclear detonations, as some have charged.

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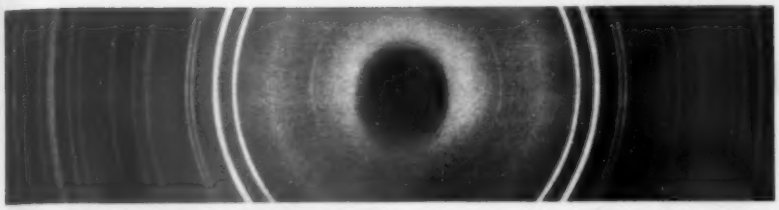

X-RAY OF COESITE—Reflections of X-rays show the stacking of planes of atoms in a sample of coesite from Meteor Crater, Ariz. Black spot shows where X-ray nozzle was inserted through the film.

GEOLOGY

Coesite From A-Bomb

➤ A MINERAL usually created when a huge meteorite crashes into the earth has been found in the depths of an atomic bomb crater.

The mineral, coesite, was discovered buried in the debris of a nuclear crater gouged out of the Yucca Flats at the Nevada test site. The tremendous energies unleashed by the atomic blast rearranged some of the atoms in the desert rocks to form the new mineral.

This is the first time coesite was identified in an atomic-bomb crater, Dr. E. C. T. Chao of the U. S. Geological Survey reported. Natural coesite, which was discovered last year (1960), is found in only three other localities throughout the world, all in meteorite craters.

The atomic bomb producing the coesite shocked and seared the rock layers when it exploded in 1955. A high pressure shock wave with energies of at least 1,200 tons of TNT rippled momentarily through the surrounding rock, changing embedded quartz grains into the new mineral.

The exact pressure needed to form the coesite is uncertain, because some of the energy was converted into heat by the explosion.

Coesite was identified in the Survey laboratories by Dr. Chao, Joseph J. Fahey and Janet Littler as part of the astrogeologic program, sponsored partly by the National Aeronautics and Space Administration. Dr. Chao discovered natural coesite in Meteor Crater, in Arizona. Since then it has been found in the Ries Crater in southern Germany and just recently in Wabar (Al Hadida) meteor crater in Saudi Arabia.

Coesite was first produced artificially in a laboratory in 1953.

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PALEONTOLOGY

Giant Ice-Age Sloth Bones for Museum

➤ BONES OF a giant, ice-age sloth, first for the Pacific Northwest, will be placed in a new Washington State Museum being planned for the University of Washington campus in Seattle, Wash.

The perfectly preserved pelvic bone measured 45 inches across. The animal, about 11 feet tall, lived nearly 10,000 years ago. The bones were described as the "best preserved specimens" turned up yet in the state.

Dr. V. Standish Mallory, geologist at the University of Washington, said they were the first from a giant sloth found in the Pacific Northwest, to his knowledge.

The ice-age sloth was a relative of the present South American tree sloth. The giant sloth probably was a ground dweller, Dr. Mallory said.

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PALEONTOLOGY

Mammoths Died Naturally

➤ THE WOOLLY mammoths discovered frozen in northern glaciers did not die from a catastrophic glacier sweeping down from the north, as popularly believed.

The hulking mammoths that roamed Siberian tundras during a recent ice age probably died by accidental drowning and were later frozen, Columbia University geologist William R. Farrand reports in Science, 133:729, 1961. The poor condition of most of the frozen giants shows that death did not occur quickly.

The popular myth that the woolly mammoths were frozen within a few hours by a huge glacier disregards all scientific facts, Dr. Farrand charges. The number of frozen mammoths found, 39, compared to the probable total population of more than 50,000, is about what scientists would expect from accidental burial.

Only four nearly complete frozen mammoth remains have been found despite many scientific explorations into the northern wastelands.

The preserved animals probably drowned in a lake or bog or were buried alive by a river bank caving in when the mammoths strayed too close to the edge. Only the heavy-footed giants, the mammoth and the woolly rhinoceros, have been found in a frozen state, indicating a "normal and expected circumstance of life on the tundra," Dr. Farrand reports.

The mammoths roamed the tundras in Siberia 10,000 to 30,000 years ago. The thick woolly skin protected them from the cold winds and storms that swept across the barren wasteland. Mammoths belonged to the same family as present day elephants, but differed considerably in appearance.

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SITE OF COESITE—The fourth location in the world known to contain the rare mineral coesite is meteor crater Wabar (Al Hadida) in Saudi Arabia. Other locations are Meteor Crater, Arizona, Ries Crater, Germany, and an atomic bomb site at Yucca Flats, Nev.

CHEMISTRY

Better Tires From Nylon 7

➤ A SIMPLE, economical process has been developed for a new kind of nylon that has superior qualities for tire cords, fish lines and wearing apparel, the American Chemical Society was told in St. Louis by Dr. C. F. Horn of Union Carbide Chemicals Company of South Charleston, W. Va.

The new nylon is called nylon 7 because it is a polymer of an amino acid containing seven carbon atoms. Ordinary nylon is called nylon 66 because it is composed of giant molecules produced by combining molecules containing six carbon atoms and two acid groups with molecules containing six carbon atoms and two amino groups. The latest kind of nylon to be introduced into this country from Europe was nylon 6. It is a polymer of an amino acid containing six carbon atoms.

Nylon 7 can be produced by boiling the ethyl ester of aminoheptanoic acid in water. The white waxy-to-brittle product can be stored or spun immediately into strong fibers. This contrasts markedly with the several steps involved in the commercial production of its two chemical cousins, nylons 66 and 6.

Nylon 7 is especially suitable for tire cords since its high softening temperature, 430 degrees Fahrenheit, enables it to withstand the deteriorating effects of the heat build-up from friction. Clear, tough films and molded objects of good impact resistance can be made from this material.

B. T. Freure, H. Vineyard and H. J. Decker joined in the research.

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Taste of Milk

➤ THE TASTE of milk can be controlled and changed by chemical means, scientists were told at the American Chemical Society meeting in St. Louis.

The major loss in palatability of milk products is caused by odorous chemicals absorbed from the animals' feed, Dr. Vladimir N. Krukovsky, Cornell University, told a symposium on milk and its products. Rancid odor and bitter taste are caused by the breaking down of fats in raw milk. Chemical reactions also cause metallic or fishy, oily and, occasionally, cardboard-like flavors in milk and milk products.

Vitamin C and oxygen play an important part in these chemical reactions, Dr. Krukovsky said. Rapid chemical methods have been developed for lowering the total vitamin C content. Not only do these methods postpone the harmful effects, but they also remove feedy flavors, he added.

Dr. R. D. McCarthy, Pennsylvania State University, reported on the microorganisms within the cow that affect the production of milk. Feed is degraded and altered by bacteria and other organisms in the first stomach of the cow, he said. These microorganisms chemically change substances in the cow's food. The changes are an essential part of the digestion process.

By selecting certain microorganisms or by stimulating them to change their chemical composition, the digestive products can be altered. In some cases, Dr. McCarthy concluded, this can have an important effect on the metabolism of the cow and the composition of milk.

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Clue to Epilepsy Cause

➤ A DISCOVERY that should eventually aid in determining the exact cause of epilepsy has been reported.

Epileptic convulsions have been produced in laboratory rats by massive doses of the common insecticide dieldrin. These convulsions were accompanied by an abnormal chemical condition in the brain of the rats, identical to that found in the human brain during an epileptic seizure.

Dr. E. A. Hosein, assistant professor of biochemistry, and Mrs. Roushan Ara, a graduate student from Pakistan of McGill University reported these findings at the American Chemical Society meeting in St. Louis.

Analysis of the brain fluid from these experimental animals showed that a mixture of biochemicals had been dislodged, and the chemicals migrated to parts of the brain not ordinarily accessible to them. This mixture, when injected into the brain of a normal animal, produced epileptic-like convulsions.

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IMPROVED TUBE LIFE—A chemical wire coating, developed by RCA Electron Tube Division, Harrison, N. J., is expected to extend the life of radio and television tubes.

EDUCATION

Ability More Than I. Q.

➤ GREAT INTELLECTUAL ability is where you find it, John M. Stalnaker, president and director of the National Merit Scholarship Corporation, said in the 1961 Walter V. Bingham Memorial Lecture given at the Carnegie Institute of Technology in Pittsburgh. It is not possible to predict, he has found, from a parent's occupation and economic background whether or not his child will have unusual mental ability.

"The public has a false image of the very bright student," Mr. Stalnaker said. They see him as a rather peculiar, introverted type—perhaps smaller in physique than the average, somewhat antisocial and probably rather narrow in his interests.

High school students selected as Merit Scholars show that "the brainy can be brawny, too." Gifted young persons generally are taller, heavier, and physically and mentally healthier than those of average intelligence.

They have a greater interest in people, less of a tendency to withdraw from social situations and show more sophistication and greater self-confidence than the average person. They are less tense, less anxious, less given to feelings of insecurity or depression.

Another mistake made by the public, in Dr. Stalnaker's opinion, is the overemphasis placed by parents, teachers and even the students themselves on the IQ. The IQ is overrated, Mr. Stalnaker said.

The pupil, the teacher and the parent should put their attention not on IQ but on results, he advised. The burning desire to excel, to be first, to be best can wisely be traded for a dozen IQ points any day. In every aspect of life, it is what one accomplishes that counts, not what his unused intelligence is, or what he might have done under other circumstances.

Teachers and parents should not discourage students from trying to excel because they have low IQ, Mr. Stalnaker said.

The National Merit Scholarship Corporation, of which Mr. Stalnaker is head, during the year 1959-60 provided scholarships to students of exceptional ability, amounting to over $2,200,000 and assisted privately supported colleges with over three-quarters of a million dollars.

The Bingham Lecture series honors the late Dr. Walter Van Dyke Bingham, a psychologist who pioneered in the recognition and measurement of various kinds of talent, particularly in the scientific and technical fields. It was established by Dr. Bingham's widow, Millicent Todd Bingham.

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ASTRONOMY

Copernican Planetarium

A new type of "planetarium" that shows the motions of the sun, moon and stars in colored lights on a screen also displays how space probes are launched, Tove Neville reports.

➤ A NEW INSTRUMENT can now be used to teach "youngsters" of all ages about what space, or the universe, contains. It is the Musser Copernican Planetarium designed by Dr. Clair O. Musser of the astronomical division of Scientific Industries, Inc., Los Angeles, Calif.

This new type of "planetarium" displays on a round four-foot screen, set in a console, the solar system in colored lights. It also shows the planets as they move in relation to each other.

For the showing of the solar system, the center light is the sun, with a red flare around it, to represent the corona. The sizes of and distances between the planets are accurate and relative to the real solar systems as far out as Mars.

This projection also shows the moon's orbital path around the earth and the ring of asteroids between Mars and Jupiter. Asteroids are small bodies thought by some astronomers to be fragments from a planet that disintegrated.

All the planets, their satellites (moons) and the sun can be individually lighted, and the light's intensity varied.

Another projection shows stars, constellations and galaxies. Stars on a disc rotate and disappear behind a black opaque area while new stars appear, simulating the stars' movement across the sky.

One feature of the planetarium is an all-time calendar worked out from the American Ephemeris. With this calendar, projections can be set at any date or year, past or future, and one is able to see in what position the stars or planets were or will be.

The new planetarium stands eight feet high and resembles a giant television set. It is being used by the Hayden Planetarium in New York for a program of adult courses in astronomy, navigation and space science.

Models of the Musser planetarium are also being used by commercial aviation companies. The instrument would be useful for teaching in universities, primary and secondary schools as well as for museums and might have an additional important use in the missile and rocket field.

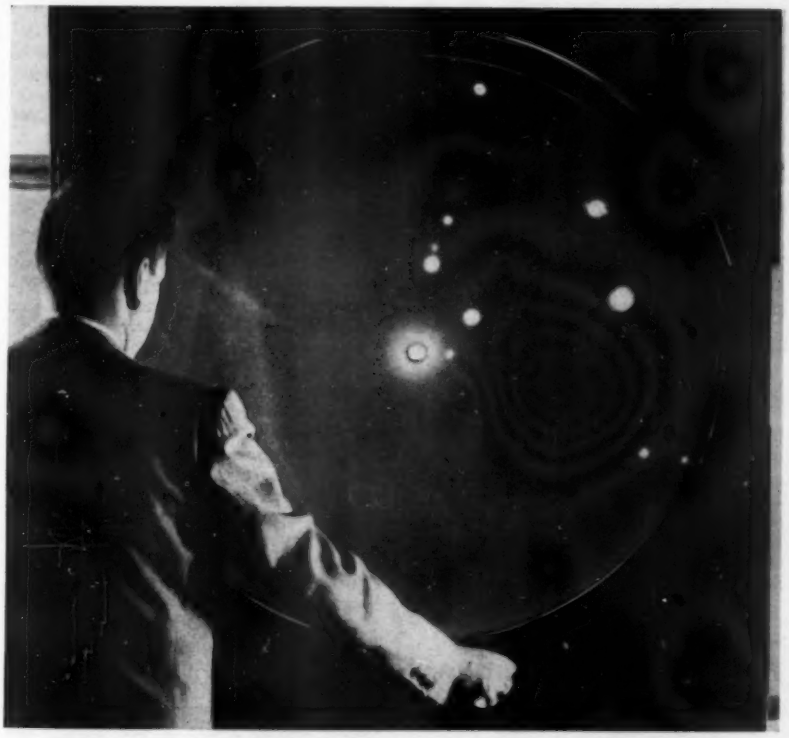
The planetarium could be an important part of the advanced navigation systems used for guided rockets and missiles as a star finding or identification device, its producers told SCIENCE SERVICE. The planetarium could in this manner provide immediate and continuous reference to the sky in an automatic star tracking device.

The planetarium can be used to demonstrate the methods and problems connected with space probes. It shows how probes can be launched to various space objectives, either with minimum orbits or with excess of energy to provide more rapid trips.

One projection shows velocities involved in transfer of a space vehicle from orbit of earth to Mars. The path taken by the space vehicle is shown by color lines in various shades of red and blue.

The Musser instrument may also be useful for on the spot television reports of the plans and actual outcome of space probes.

• Science News Letter, 79:199 April 1, 1961



COPERNICAN PLANETARIUM TEACHES ASTRONOMY

MEDICINE

Cigarettes Blamed Again

➤ STOP SMOKING cigarettes to save yourself from lung cancer. This warning is emphatically reiterated, in medical language, in an authoritative article in the Journal of the American Medical Association, 175:997, 1961.

Two experts of the Sloan-Kettering Institute for Cancer Research, New York, Drs. Ernest L. Wynder and Emerson Day, declare that there is sufficient evidence of a causal relationship between cigarette smoking and lung cancer. They state:

"Obviously, if a statistical and epidemiological relationship has been proved, then the removal or modification of the factor (cigarette smoking) is indicated."

They cite 30 studies applying statistical evidence that "the more a person smokes, particularly cigarettes, the greater is his risk of developing cancer of the lung." They take issue with the contention that the relationship between smoking and lung cancer could be attributed to some constitutional factor that makes one smoke cigarettes and be susceptible to lung cancer.

Lung cancer is discussed only as an example in setting forth general postulates for the evaluation of causative factors in chronic diseases, which they described as noninfectious disorders caused by multiple factors.

(The Tobacco Institute, Inc., of Washington, D. C., in commenting on the article, said, "Careful readers will see that the authors offer no new findings or new scientific results to support their opinions set forth in this article.")

• Science News Letter, 79:199 April 1, 1961

MEDICINE

"Sophisticated" Pill Spots Stomach Troubles

➤ A MORE sophisticated "radio pill" that can be swallowed by a patient and tuned in by a doctor to see if anything is wrong was reported at the Institute of Radio Engineers International Convention in New York.

The tiny pill, which beams out information about the patient's stomach, is periodically pepped up by an outside energy source. Previous battery-powered radio pills extremely limited the doctor's studies because the battery wore out so quickly.

The pill measures the activity of the stomach and intestine as it passes through them, transmitting the information to an FM receiver outside the body. The sensitive instrument records the pressure changes within the stomach and intestinal tract. An antenna wrapped around the patient picks up the sensitive radio pulses.

Clinical tests are promising, Dr. V. K. Zworykin of the Rockefeller Institute for Medical Research said. Other possible applications include the study of the bladder.

Research is now under way to reduce the capsule to the size of an aspirin, and to measure the temperature and acidity of the stomach and intestinal tract.

Dr. Zworykin and his associates, Dr. J. T. Farrar of the Veterans Administration Hospital, New York, R. C. Bostrom and G. J. DeBoo of Airborne Instruments Laboratory, and F. L. Hatke of Radio Corporation of America developed the radio pill. Dr. Zworykin, a pioneer in the invention of television, was also the co-designer of the first radio pill.

• Science News Letter, 79:200 April 1, 1961

MEDICINE

Flies, Mice and Humans United in Cancer Study

➤ A TUMOR-INDUCING substance can be extracted from persons in normal health as well as from those with cancer.

Called TIC, for tumor-inducing-complex, the substance is taken from blood or tumors of human beings. It causes melanotic tumor in strain 51-52 of Drosophila, or fruit fly, and cancer in a certain strain of mice.

Dr. Antonio Rottino, St. Vincent's Hospital, New York, reported a study still continuing at the hospital which may lead to better understanding of tumor growth, both normal and abnormal.

"To date we have only scratched the surface of a complex problem," he told the American Cancer Society's science writers' seminar at St. Petersburg, Fla.

Dr. Rottino's group extracted two other factors from the same source material for TIC, one of which enhanced the activity of TIC and the other reduced it. Further extraction finally produced a substance that was completely inactive, called TF for short.

"Most interesting," he said, "was an experiment which showed that if activator was added to the inactive TF, TIC was reconstituted and would once more cause not only 'melanotic tumor' (in the form of a black spot in the fruit fly) but carcinoma in our strain of mice."

Previously, his group obtained extracts capable of inducing tumors in mice from mouse leukemic tissues, Drosophila larvae with melanotic tumors, human cancer, mouse leukemia, Rous chicken sarcoma, human lymphoma and from cultures of the bacillus responsible for crown gall in plants.

"As far as we know," Dr. Rottino said, "this was the first time that anyone had succeeded in extracting cell-free material from tumors of human beings that would consistently induce malignant tumors in mice."

• Science News Letter, 79:200 April 1, 1961

METEOROLOGY

Oceans Influence Snow For Hundreds of Miles

➤ A BLINDING snowstorm hitting a remote town in North Dakota is strongly influenced by the oceans many hundreds of miles away.

Heat radiating from the ocean surface during winter plays a very important role in storms breeding over parts of the United States, Dr. Sverre Petterssen of the University of Chicago told the American Meteorological Society meeting in Chicago. The heat dampens or absorbs some of the potential energy present in the atmosphere that could probably burst into kinetic or active energy during formation of storms.

In previous years, meteorologists theorized storm centers or cyclones crystallized when huge storehouses of atmospheric potential energy were triggered into kinetic energy. Recent scientific studies, however, underline the ocean's importance in storm development.

The warm air masses formed over the oceans strongly influence the location and formation of the turbulent regions, Dr. Petterssen said. The warm air forms over the oceans when the sun's rays strike the ocean surface.

• Science News Letter, 79:200 April 1, 1961

RADIO

Electronic Instrument Helps Blind "See"

➤ A HANDY electronic instrument carried by a blind person to warn him of obstacles in his way has been developed. The compact, two-pound instrument "sees" for a blind person by sending out nearly invisible light waves up to nine feet away.

Any obstacle in the way causes the light to trip a vibrator, warning the blind man, J. Malvern Benjamin Jr. of Biophysical Electronics, Inc., New Hope, Pa., told the Institute of Radio Engineers International Convention in New York.

A portable model of a curb detector has been built experimentally. It is still being developed for practical use.

• Science News Letter, 79:200 April 1, 1961

IN SCIEN

GENERAL SCIENCE

States Search for Science Talented in High Schools

➤ HUNDREDS of high school seniors who are outstandingly talented in science have been selected to receive honors and thousands of dollars in college scholarships by state Science Talent Searches in 38 states and the District of Columbia.

Sponsored by state academies of science, universities and colleges, museums and scholarship foundations, the state Searches are conducted by special arrangement with Science Clubs of America and SCIENCE SERVICE and are held in conjunction with the national Science Talent Search for the Westinghouse Science Scholarships and Awards.

A Science Clubs of America summary of Science Talent Search activities for last year, showing a total of 435 students selected for state honors and nearly $80,000 in scholarships awarded, is now available.

Winning students were given awards of books, subscriptions to scientific journals, scholarships and opportunities to attend scientific meetings, tour laboratories and confer with professional scientists. The awards were made at banquets, special meetings of state academies of science, programs on university campuses and at state science fairs.

Many state directors reported plans for expanded programs and awards for the 1961 state Searches.

• Science News Letter, 79:200 April 1, 1961

BIOLOGY

Hall of Biology of Man Uses New Approach

See Front Cover

➤ THE HALL of the Biology of Man, featuring sculptures of the delivery of a baby and a "transparent woman," opened at the American Museum of Natural History in New York.

Models for the hall were made from new materials using new techniques. Clear plastic, superimposed in layers showing successive stages of a body process, when lighted at the edge, produces the illusion of depth, movement and steps in a cycle.

This process has been used to show the circulatory system with a pulsating heart and flowing blood and also how the ovum is fertilized in the uterus.

The mechanics of human locomotion, seen on the cover of this week's SCIENCE NEWS LETTER, are demonstrated by pelvic, leg and foot bones and aluminum cutouts.

The Hall of Biology has been fifteen years in the planning, six years in construction and cost $450,000 to build.

• Science News Letter, 79:200 April 1, 1961

E FIELDS

PUBLIC HEALTH

Wrong Breathing Blamed for Drownings

➤ PRIZES FOR competition in underwater swimming should not emphatize the length of time the swimmer can hold his breath.

One of the ways in which a person may drown is to hold his breath too long and lose consciousness while swimming underwater.

"Passing out" underwater, Dr. Albert B. Craig Jr., of the University of Rochester School of Medicine and Dentistry, told the American College of Sports Medicine meeting in Atlantic City, N. J., may lead to death when the unconscious swimmer automatically breathes.

Dr. Craig has designed and performed experiments involving hyperventilation, or over-breathing, breath-holding and exercise, substituting riding a stationary bicycle for swimming.

Dr. Craig noted that when the subjects over-breathed and then exercised, holding their breath as long as they could, the concentration of oxygen in their lungs became extremely low. One danger of low oxygen concentration, or hypoxia, is that the person has little or no warning that he is about to pass out.

• Science News Letter, 79:201 April 1, 1961

SOCIOLOGY

Camp Experiment May Point Way to Peace

➤ AN EXPERIMENT conducted in a boys' camp to build up and then wipe out mutual antagonism may point the way to reduction of international tensions and eventual world peace.

The experiment and suggestions for application to international relations were reported by Dr. Jerome D. Frank of Johns Hopkins University to a joint meeting in New York of the American Orthopsychiatric Association and the World Federation for Mental Health.

In the camp experiment, boys who did not even know each other were made into two enemy groups through use of team competition. The camp leaders then tried to wipe out the mutual antagonism. Merely bringing the two groups together in social activities such as movies or meals had no effect.

What was effective in reducing the antagonism was the creation of situations which presented threats to the entire camp that could only be resolved by the cooperation of everyone.

When the camp water supply failed, the whole camp had to work together to restore the water. The camp truck ran into a ditch and the whole camp had to work together to pull it out.

After a few such incidents, Dr. Frank reported, the enmity between the two groups was markedly reduced.

On the international scale, a similar tension-reducing step is the Antarctic Treaty which permanently demilitarizes Antarctica. Dr. Frank calls this action "the one important international tension-reducing step." It was, he says, a direct outgrowth of the International Geophysical Year in which Russia and the United States cooperated to gain knowledge that neither could have obtained alone.

Perhaps the greatest obstacle to any step to reduce tensions between the U. S. and Russia is the fear that it will be interpreted as a sign of weakness, Dr. Frank pointed out.

This fear could be reduced, he said, if the U. S. would give plenty of advance notice of such a step. It should be made clear that the U. S. expected Russia to make a similar tension-reducing step. But a tension-reducing step should not be made dependent upon Russia's reciprocal action or definite promise of such action.

• Science News Letter, 79:201 April 1, 1961

TECHNOLOGY

Moon Dust Could Drown Space Vehicle

➤ THE FIRST space vehicle landing on the moon could be swallowed up by dust on the moon, Keeve M. Siegel of the University of Michigan warned at the Institute of Radio Engineers International Convention in New York.

Scientific studies of rocks and minerals probably similar to those on the moon indicate scientists should not take this warning lightly, he said. Meteorites and tektites were tested under near vacuum conditions, imitating the conditions on the moon's surface.

• Science News Letter, 79:201 April 1, 1961

MEDICINE

What Doctors Read In Journal of AMA

➤ ARTICLES that doctors read in the Journal of the American Medical Association, 175, 1961:

Key personnel in sensitive Government agencies should be given psychiatric screening.—Dr. Zigmond M. Lebensohn of Washington, D. C.

A major cause of illness among United States servicemen in the Tokyo-Yokohama area of Japan is smog-associated asthma.—Maj. Harvey W. Phelps, Capt. Gerald W. Sobel and Capt. Neal E. Fisher, U. S. Army medical officers.

Mongoloid children in institutions develop more slowly than those kept at home.—Dr. Robert B. Kugel and David Reque of State University of Iowa College of Medicine.

More medical schools within the next decade will establish full-scale courses on hypnosis for practicing physicians like the one at the University of Pennsylvania.—Drs. Harold Rosen and Leo H. Bartemeier, Baltimore, Md.

• Science News Letter, 79:201 April 1, 1961

GENETICS

Benign Kidney Tumors Hereditary in Rats

➤ BENIGN, or non-cancerous, kidney tumors in rats are inherited through the action of a single dominant gene, research indicates.

Scientists have suspected for seven years that this was true. The idea is being tested by Drs. Reidar Eker and Jeanne Mossige of the Norwegian Radium Hospital in Oslo, Norway, and their first results show that the theory probably is correct.

A tumor-bearing male rat, the offspring of a normal father and a tumor-bearing mother, was mated to six white, normal female rats. Of the 89 young that survived long enough to be examined, 41% had tumors. This is close enough to the expected 50% to be significant, the investigators report in Nature, 189:858, 1961.

Further breeding experiments are now in process to see whether subsequent generations produce tumor-bearing young in the expected proportions.

So far there is no indication that tumor tendency or severity is related to sex. Nor is there any evidence that the number of pregnancies enhances tumor development in female rats.

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RADIO

U. S. Sends Radio Signals to Venus

➤ THE UNITED STATES has bounced radio signals from Venus back to earth in a 70,000,000-mile round trip taking about six and a half minutes.

The success of a two-month experiment aimed at unveiling some of the mysteries of the planet Venus was announced by Dr. Hugh Dryden, deputy administrator of the National Aeronautics and Space Administration, and Dr. William H. Pickering, director of the Jet Propulsion Laboratory.

As a result of the experiments, scientists expect to be able shortly to determine whether Venus spins on its axis and the rotation speed; the orientation of the planet's spin axis; to investigate the surface of Venus; and to further define the measuring stick of the universe, the approximately 93,000,000-mile astronomical unit. This is the mean distance from the earth to the sun and may be plus or minus 10,000 miles.

Two 85-foot radio antennas were used for the Venus experiment at the Jet Propulsion Laboratory Goldstone Tracking Station in the Mohave Desert in California. JPL is operated under contract for NASA by the California Institute of Technology.

Several months went into the preparations involved in setting up the antenna. The transmitting antenna, located seven miles from the receiving antenna, sent a 2,388 megacycle signal to Venus, using about ten kilowatts of power. The signal was a conical beam only four-tenths of a degree in width.

• Science News Letter, 79:201 April 1, 1961

PHYSIOLOGY

Porpoise: Intelligent Sea Creature

Porpoise studies may result in new designs for ships, a more sensitive sonar system, and a basis for communication with intelligent, non-human creatures, Gloria Ball reports.

➤ WHATEVER the porpoise has, the Navy wants it, and the United States Government is spending $200,000 to find out what it is and how to copy it.

This frolicsome sea mammal, sometimes called a dolphin, has a sonar (sound-sensing) system that can outdo anything man has devised. It swims with so little effort that ship captains can only watch with envy. And in spite of being an air-breathing creature, the porpoise can stay under 1,000 feet of water for an incredibly long time, and then come up quickly without getting the bends.

As to intelligence, some researchers now believe the chimpanzee is losing ground and that the porpoise is second only to man in intelligence. The porpoise can learn to avoid electric shock by flipping a switch in less than 20 trials, a task that may take many more trials for the chimp.

The porpoise brain is complex, well developed, and larger than man's. In proportion to body weight, however, the porpoise brain is smaller.

One authority on porpoise intelligence is neurophysiologist John C. Lilly, presently working at the University of Miami in Coral Gables, Fla., while new facilities are constructed at St. Thomas in the Virgin Islands. His research has revealed that communication between porpoises consists of several distinct sounds such as squawks, snorts, whistles, gurgles, buzzes and squeaks, used separately or in "word" combinations. At times the animals have imitated, in a Donald Duck voice, words spoken by Dr. Lilly and his helpers.

May Communicate in English

Someday scientists and porpoises may understand each other well enough to communicate in English, porpoisese or polyglot. So far, Dr. Lilly has reported understanding of only one porpoise sound. This is the distress signal, a running squeal that rises and falls in pitch. Voiced when the animal is hurt or in trouble, it never fails to summon help from other porpoises.

Equipped with intelligence and a fantastic sonar system, the porpoise is a virtual dead-eye in the water.

So accurate is this object-finding technique that a blindfolded porpoise can navigate unerringly around pipes and bars being moved through the water. It can tell which fish is blocked off by glass and which one is free. It also can distinguish, possibly by the movement patterns, which fish is good eating and which is not. If a half teaspoon of water is dropped six feet into a pool, the porpoise knows. And when the water is slapped with the hand, a porpoise can swim to the spot from 60 to 80 feet away and not miss it by more than eight or nine inches.

Porpoise sonar is not only more accurate than man-made sonar, but also detects at much greater distances. Obviously the Navy would like to know how the creature does it.

It is known that sonar sounds emitted by the porpoise are different from the whistles and squawks of communication.

One of the first porpoises used for sonar research, about 1955, was a cantankerous old bull who "creaked" as he searched for food. The creaking, similar to the sound of a rusty hinge, is actually a series of clicks repeated 10 to 400 times per second.

This old man of the sea was blind in the right eye and losing sight in the left. This fact helped the researchers, Dr. William E. Shevill and Barbara Lawrence of Woods Hole, Mass., determine how much looking and how much "echo location," as animal sonar was called, was involved in food finding.

Porpoises generally react to sounds up to 80,000 cycles per second. The upper limit for human hearing is 20,000.

But Notty, a female porpoise named for the Naval Ordnance Test Station in China Lake, Calif., where she is trained and tested, has broken the record for sounds emitted. She has whistled, buzzed and gurgled at frequencies all the way from 750 cycles per second to 300,000. Some of the sounds come from the blowhole, some are from the larynx, and some are produced by other body organs.

Notty, four years old, 180 pounds, and six feet long, also is being used for hydrodynamic studies. She has been trained to dash off at top speed and to crash stop while wearing either suction cups with electrodes attached or plastic body rings for which drag resistance is known. As she swims by, high-speed cameras record the flow pattern. The patterns may be studied in another way—by painting the animal with dyes that wash off and leave trails in the water.

For some reason the porpoise, which swims by up and down motions rather than sidewise motions like a fish, gets about 10 times as much horsepower per unit of muscle as a man or a dog. Put another way, it gets more miles per wiggle.

Although swimming speeds of 25 to 30 knots have been reported by reliable ship

SING A SONG—Two porpoises at the Marine Studios, Marineland, Fla., sing along in whistles, buzzes and squawks. Will they ever sing in English?

captains, no scientist has verified this to date. Notty has been clocked at 16 knots top speed, and her handlers still do not know whether she is incapable of going faster or whether she is being temperamental.

Whether the porpoise is swimming lazily or bolting to the rescue, there is almost no turbulence or wake, indicating drag, behind the animal. If boats, ships and torpedoes could be made to move with the same ease, sailing and underwater warfare could be revolutionized.

This was the goal of Dr. Max O. Kramer, a German-born expert in fluid dynamics who conceived the idea of applying a porpoise skin made of rubber to the hulls of vessels. This concept is coming to fruition in the form of Lamiflo coatings being developed by the U. S. Rubber Company.

Coatings Not Perfect Yet

The coatings are not yet perfected and scientists are still trying to find out how the real animal gets the very thin layers of water nearest the body to slide smoothly over each other rather than letting them flow at different speeds to produce turbullence and drag.

Smooth flow apparently is enhanced by the two-layered porpoise skin, constructed somewhat like a building with a flat roof resting on millions of flexible pillars.

Skin on the front end of the porpoise, from the nose to about three feet back, has very few blood vessels. Very little drag would be expected here. But toward the tail, where the skin has numerous blood vessels, there is still no drag.

The China Lake team, headed by Dr. Rene Engel, believes the expected tail drag may be reduced effectively by heat transfer or by skin mobility.

One aspect of porpoise physiology, however, really has scientists stumped. This is the question of deep sea diving and the bends, or caisson disease. When a human diver surfaces too fast, the nitrogen dissolved in his blood comes out of solution and forms bubbles. He doubles over with cramps, gasps for breath and finally collapses unconscious.

The porpoise can submerge to 1,000 feet and come up chattering gaily. Its bigger relative, the whale, can perform the same feat from depths of 3,000 feet. Apparently nitrogen bubbles give them no trouble.

Porpoise organs and tissues have been studied for more than 30 years and researchers still do not know how the blood gases are processed. Because these animals can stay under water for long periods, it is suggested that they can store up oxygen, perhaps in the muscles, and eliminate carbon dioxide by some method other than exhalation from the lungs.

Research porpoises, most of which are bottle-nosed porpoises, or *Tursiops truncatus*, work hard. They can be stubborn about refusing to wear uncomfortable blinders and harnesses, but this is actually a help because the porpoise works best when it is comfortable. For the most part they are cooperative. Some even adjust the fit of training gear to their own bodies. They work so many hours a day that they frequently sunburn their foreheads, and handlers have learned that their pupils appreciate an application of petroleum jelly now and then.

Throughout, the porpoises maintain their sense of humor and each is a pet to its own group of scientists. No one minds when an animal flings a fish back in his face. This is par for the playful, puzzling porpoise.

• Science News Letter, 79:202 April 1, 1961

MEDICINE

Migraine Sufferers Bright

PERSONS SUFFERING from migraine headaches are almost without exception intelligent, regardless of the schooling they have had, Dr. Charles D. Aring, director, University of Cincinnati department of neurology, told a symposium on cardiovascular diseases in Louisville, Ky. However, they are tense and inflexible.

"Migraine victims are tense, striving, perfectionistic and orderly people," Dr. Aring said, going on to point out that such patients are not only overly conscientious about the performance of their own "duties" but in their requirement of behavior from others.

These attitudes are bound to be frustrating, the neurologist added, since their requirements cannot be met consistently.

However, there are persons of this pattern who never have migraine, he noted, commenting that the disorder is not that simple.

"Drugs that constrict blood vessels may be helpful in treatment," he said "but analgesics, sedatives and 'tranquilizing' drugs have limited uses."

He explained that "psychotherapy is usually required in any thorough-going treatment," and that perhaps re-education is the most useful single factor in relieving symptoms.

The sufferer is dependent upon others for approval, Dr. Aring reported, instead of depending on valid self-approval.

"The hard work that he is willing to do to garner such approval is a reflection of the magnitude of the need," he said. "His meticulous and effective performance under these circumstances exacts an undue toll on what we may call his energy stores."

While these energy stores are strong, as in childhood, such a pattern can be supported, he said, but migraine usually makes its appearance during adolescence or later when, with increasing responsibility or decreasing energy, a difficult way of life becomes harder to maintain.

Migraine is either becoming increasingly prevalent or is increasingly recognized in early childhood, Dr. Aring said.

• Science News Letter, 79:203 April 1, 1961

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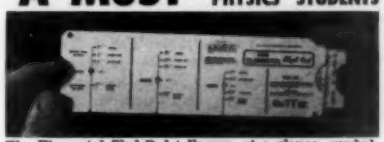
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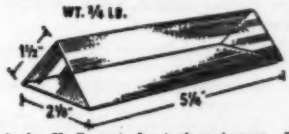

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• Books of the Week •

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ANNUAL REVIEW OF PSYCHOLOGY, Vol. 12—Paul R. Farnsworth, Olga McNemar and Quinn McNemar, Eds.—*Annual Reviews*, 553 p., $7. Reviews the year's literature in such areas as developmental psychology, brain functions, and concept formation.

ARCHAEOLOGY IN CHINA—William Watson—*Parrish (Taplinger)*, 32 p. text, 123 plates, $15. More than 140 photographs of some of the most important recent archaeological discoveries of the Bronze-Age river valley civilizations in China, comparable in technical knowledge and social development to the ancient civilizations of the Nile and Euphrates.

AN ATLAS OF JUVENILE MMPI PROFILES—Starke R. Hathaway and Elio D. Monachesi—*Univ. of Minn. Press*, 402 p., $8. Provides brief case histories of 1,088 adolescent boys and girls with their accompanying Minnesota Multiphasic Personality Inventory data.

AUTOMATION IN EDUCATION: Machines and Men as Teachers and Learners—Eugene Galanter, Ernst Z. Rothkopf and Laurence Siegel—*Teachers College Record*, 27 p., 50¢. Reprint from December 1960 issue.

THE AUTOMOBILE ENGINE—William Weinstein—*Chilton Co.*, 623 p., illus., $7.95. Word-and-picture description of all phases of the modern automobile engine, with glossary.

BASIC TRANSISTORS—Alexander Schure—*Rider, J. F.*, 146 p., illus., $5.50; paper, $3.95. Simplified, highly pictorialized text.

BIOLOGICAL CLOCKS: Cold Spring Harbor Symposia on Quantitative Biology, Vol. XXV—Erwin Bunning and others; Leonora Frisch, Ed.—*Biological Lab., L. I. Biol. Assn.*, 530 p., illus., $12. Leading investigators report on phenomena of time measurement in plants and animals.

BLIND JACK—Stephanie Ryder, foreword by Maurice Burton—*Houghton*, 145 p., photographs by Jane Burton, $3.25. Day-to-day observations of a blind jackdaw.

THE CITY IN HISTORY: Its Origins, Its Transformations and Its Prospects—Lewis Mumford—*Harcourt*, 657 p., photographs, $11.50. Follows the development of the forms and functions of the city through succeeding urban cultures, from Egypt and Greece to our time.

CLOSED CIRCUIT RESPIRATORY SYSTEMS SYMPOSIUM—Life Support Systems Laboratory—*WADD-USAF (OTS)*, 470 p., illus., paper, $6. Papers representing the most advanced state of the art.

DICTIONARY OF MECHANICAL ENGINEERING—Alfred del Vecchio—*Philosophical Lib.*, 346 p., $6. Definitions in the fields of architecture, automatic controls, fuels and combustion, and engineering mechanics.

THE EARTH'S PROBLEM CLIMATES—Glenn T. Trewartha—*Univ. of Wis. Press*, 334 p., illus., $7.50. Analysis of those climates of the world which do not conform to standard pattern and explanation of their characteristics.

EDUCATION ASSOCIATIONS: Education Directory, 1960-1961, Part 4—Bobbie Doud—*Office of Education (GPO)*, 117 p., paper, 50¢. Lists national, regional, state, religious and international education associations.

THE EDUCATION OF NATIONS: A Comparison in Historical Perspective—Robert Ulich—*Harvard Univ. Press*, 325 p., $6.75. Combines historical and comparative approach in showing the forces that have molded the educational ideals and systems of England, France, Germany, the United States and Russia.

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GAS CHROMATOGRAPHY—Henry J. Noebels, R. F. Wall and Nathaniel Brenner, Eds.—*Academic*, 463 p., illus., $16. Proceedings of the Second International Symposium held under the auspices of the Analysis Instrumentation Division of the Instrument Society of America, June, 1959.

GLOSSARY OF GENETICS AND OTHER BIOLOGICAL TERMS—Russell B. Clapper—*Vantage*, 200 p., $3.95. Covers the fields of genetics, cytology, plant and animal breeding.

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THE JOURNAL OF TRAUMA, Vol. I, No. 1—Rudolf J. Noer, Ed.—*Williams & Wilkins*, 83 p., illus., paper, $2.50; bi-monthly, $10 per year. Official journal of the American Association for the Surgery of Trauma.

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NUCLEAR SCIENCES ABSTRACTS 1960; Annual Index, Part 1: Corporate Author Index, Personal Author Index, Report Number Index. Part 2: Subject Index.—Office of Technical Information—*US AEC (GPO)*, 754 p., 758 p., paper, $4.25 each.

THE NUMBER STORY—Herta Taussig Freitag and Arthur N. Freitag—*Nat. Council of Teachers of Mathematics*, 76 p., illus., paper, $1. Introduces students to historical development of numerals and numeration, methods of computation, and rational, irrational and complex numbers we use today.

OERSTED and the Discovery of Electromagnetism—Bern Dibner—*Burndy Lib.*, 46 p., illus., $2. Illustrated with reproductions of original material, this monograph pieces together the history of the Danish professor of physics who in 1820 first demonstrated the link between electricity and magnetism.

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THE PSYCHOANALYTIC STUDY OF SOCIETY, Vol. I—Warner Muensterberger and Sidney Axelrad, Eds.—*Int. Univs. Press*, 384 p., $7.50. Continuation of five-volume series "Psychoanalysis and the Social Sciences."

PSYCHOTHERAPY WITH SCHIZOPHRENICS: A Reappraisal—Joseph G. Dawson, Herbert K. Stone and Nicholas P. Dellis, Eds.—*La. State Univ. Press*, 156 p., $5. Presents the views of a group of practicing psychotherapists.

REVIEW OF THE NATIONAL RESEARCH COUNCIL, 1960—E. W. R. Steacie, Pres.—*Nat. Res. Council, Canada (Queen's Printer)*, 354 p., paper, 75¢. Contains reports on research in the Canadian science and Canadian engineering laboratories.

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THE STANDARD GUIDE TO MEXICO, 1961-1962—Lawrence and Sylvia Martin—*Funk*, 297 p., maps, paper, $1.95. Up-to-date travel guide.

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THE STRUCTURE OF THE EYE—George K. Smelser, Ed.—*Academic*, 570 p., illus., $15. Symposium papers and discussions on the fine structure of ocular tissues by leaders in electron microscopy from three continents.

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WASTE DISPOSAL IN THE MARINE ENVIRONMENT :Proceedings of the First International Conference—E. A. Pearson, Ed.—*Pergamon*, 569 p., illus., $12.50. Papers presented by leading authorities covering such aspects as public health, nearshore oceanography, and effects on marine biota.

• Science News Letter, 79:204 April 1, 1961

INVENTION

Patents of the Week

A jet device for undersea propulsion and a kind of Submarine decoys have been patented. A ground control system for airplanes and an oil-well rig are other recent inventions.

➤ THE JET AGE will soon invade the ocean depths when a patent issued to one of America's top outer space experts is applied.

Dr. Fritz Zwicky, astrophysicist at the California Institute of Technology, has patented a device (No. 2,974,626) that opens up new realms in the undersea world. Sneaky torpedoes tracking and destroying enemy ships, submarines quickly but silently darting through the murky depths and jet-assisted take-offs for deep sea exploration are envisioned in the patent assigned to Aerojet-General Corporation.

Objects are propelled through the water by an explosive chemical reaction generating tremendous energy. Strong chemicals, such as metal hydrides, are used to react violently with water, forming gases that make a hasty exit through the exhaust nozzle. The pressure force "pushes" the object through the water.

A "school" of submarine decoys surrounding a real submarine could help cut down the submarine (not the missile) gap between the Russians and the United States. A decoy (No. 2,975,396) patented for the U. S. Navy sends out signals, imitating a submarine, to enemy search craft cutting through the waters overhead. Ship instruments, recording the "blips" on a sonar screen, pinpoint the non-existent submarine and the real submarine slips away undetected. By shutting off the signals periodically, the searchers think they have lost the "submarine," inventor Richard A. Mueller of San Diego stated in his patent.

A portable, simplified ground control system providing flying and taxi information for airplanes won patent No. 2,975,413 assigned to Gilfillan Bros. Inc., Los Angeles.

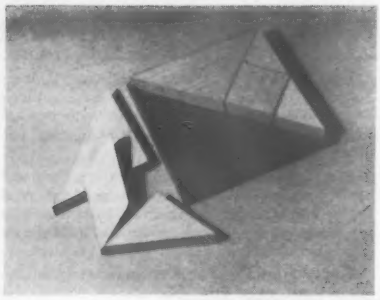
The compact radar unit is ideal for small airports where space is valuable. Seven California scientists who combined their talents to produce the invention are: Robert W. Landee, James R. Deen, John J. Fling, Robert G. Shaw, Ronald R. Davis, James K. Johnston, and Paul L. Bennett.

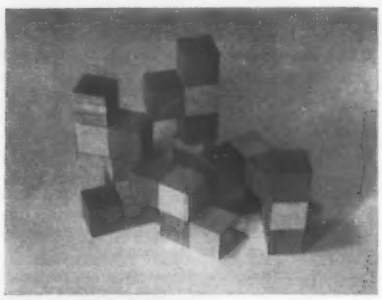
An oil-well rig that can be lifted by helicopter over mountains and other rough terrain to the remotest areas not reached by roads was patented by Homer J. Woolslayer, Calvin L. Turner and Cecil Jenkins of Tulsa, Okla. The invention, patent No. 2,974,760, was assigned to Lee C. Moore Corporation. Oil rig sections, identical except for the top and bottom of the rig, are carried by cable and stacked like building blocks, one on top of the other, in another location. The bottom section of the old rig becomes the top of the new rig.

A device controlling the flow of traffic into unattended parking lots has been patented. A car running over a treadle switch lifts up a gate, permitting the driver to pass through. Another treadle switch closes the gate behind him. Other means, not covered by the invention, can be used to keep out persons who do not have permission to park in the lot. The invention, Eugene T. Mahoney of Chicago, Ill., assigned patent rights of patent No. 2,975,350 to Johnson Fare Box Company, also of Chicago.

A system (patent No. 2,974,441) by which toys can be remotely controlled by children, was patented by Helmut Denner of Aargua, Switzerland. Toys, such as automobiles, can veer to the left or right, or back up, to a child's delight, by a simple command into a microphone.

• Science News Letter, 79:205 April 1, 1961





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GENERAL SCIENCE

World Congress Will Use Interlingua for Abstracts

➤ INTERLINGUA, the auxiliary world language, is to be used for abstracts of papers before the World Congress of Psychiatry to be held in Montreal, Canada, June 4 to 10.

This will allow all to have access to summaries of the communications presented to the sessions without the cost and bulk of translating into the usual multiplicity of national languages.

The Interlingua translations will be facilitated by the Interlingua division of SCIENCE SERVICE of which Dr. Alexander Gode is the chief.

This is the ninth international congress to use Interlingua since it came into use in 1953. More than 20 medical journals, including the Journal of the American Medical Association, carry abstracts of original articles in Interlingua.

Based on the languages of western culture, Interlingua can be read with no more than one semester of high school French, Spanish or Latin. Much can be read and understood with no foreign language background. A standardized vocabulary, absence of regional peculiarities, and a simple grammar are its main attractions.

• Science News Letter, 79:206 April 1, 1961

INVENTION

Remote Control System For Radioactive Material

A remote control system for handling radioactive material in a sealed chamber has won patent No. 2,973,107 for Guy Cherel of Clamart, France. Known as a "telemanipulator," the system uses magnetic controls to manipulate radioactive objects.

Mechanical arms with tongs are mounted on a beam within the sealed chamber. The arms are magnetically controlled by instruments outside the chamber.

Magnets attached to both sides of the chamber wall permit manipulation within a completely sealed chamber, the inventor claims. Present remote control methods need openings in the chamber walls for the instruments. This presents awkward and dangerous maintenance problems, and also restricts the action of the apparatus, Mr. Cherel said.

• Science News Letter, 79:206 April 1, 1961

Questions

GEOLOGY—At how many sites on earth has coesite been found? p. 197.

MEDICINE—For which diseases has the drug methotrexate been used? p. 195.

Photographs: Cover, American Museum of Natural History; p. 195, George C. Marshall Space Flight Center; p. 197, top, U. S. Geological Survey, bottom, Arabian American Oil Company; p. 198, Radio Corporation of America; p. 199, Scientific Industries, Inc.; p. 202, Marine Studios, Marineland; p. 208, Metallindustrie Denkingen.

MEDICINE

Vaccine Step-Up Needed

▶ UNLESS INDUSTRY moves in faster than it now appears, a crash Government program will be needed to put the Sabin oral poliovirus vaccine into production, the chairman of the Subcommittee on Health and Safety of the House of Representatives Committee on Interstate and Foreign Commerce reported.

Rep. Kenneth A. Roberts (D.-Ala.) backed up Rep. Paul G. Rogers (D.-Fla.), a member of his subcommittee, who told Dr. Albert B. Sabin at the hearing that "the committee will do what it can to put oral vaccine on a crash program."

In the course of questioning, Dr. Sabin was asked how the United States could move ahead faster.

"Immediate operations are possible," Dr. Sabin answered, "even if some batches have to be discarded."

However, he said we should plan for mass production and let the six or more pharmaceutical companies now making Salk vaccine know what place this killed virus vaccine will have in the future.

In an interview, Dr. Sabin told SCIENCE SERVICE that "there is no scientific reason to have both Sabin and Salk vaccine once there is enough of the oral live virus vaccine. Until we have enough, of course both must be used."

President Kennedy's proposal for Federal financing of $1,000,000 worth of the new Sabin vaccine for possible use in communities threatened with epidemic "is only a small step," Dr. Sabin said.

"To have millions of doses lying in reserve is not the best approach," he added.

He told the subcommittee that the Soviet Union makes 20,000,000 doses of the live vaccine each week and will have a capacity sufficient to sell cheaply or give away supplies to countries that need it.

"If we could plan not only for small lots but for international health programs," he said, "we could mass produce the vaccine at a cheaper price for the United States and have something for the world."

He estimated a possible cost of at least one-tenth of the Salk vaccine, now selling at 20 cents top price.

"One British pharmaceutical company can make as many as 500,000 to 2,000,000 doses of Sabin-type vaccine from the kidneys of one monkey," the witness said. "This company has 50,000 doses ready, and already Brazil, Uruguay and other South American countries have shown an interest in receiving a supply."

He said that polio is appearing in Asian countries for the first time and they would need vaccine. China and Japan are reporting more than previously. Egypt had 1,700 cases last year and Israel had 700.

Administration of a live poliovirus vaccine program in this country need arouse no question of dictatorship and upsetting the American voluntary system, Dr. Sabin said.

In Cincinnati, the Board of Health a year ago promoted a program administered in two ways, which he holds up as a pattern for the nation. In Cincinnati schools, 111,000 children received vaccine that had been kept in a frozen state and was still good after four years. In addition, 265 private physicians opened their offices and gave vaccine free. To aid the doctors, the health department opened 34 clinics.

It is expected that the U. S. Public Health Service will be ready to license the Sabin vaccine in a matter of weeks so pharmaceutical companies can start production. Chas. Pfizer & Co. is farthest ahead because of vaccine already made in its London plant.

• Science News Letter, 79:207 April 1, 1961

MEDICINE

Recurrent Breast Cancer

▶ A 30-YEAR SURVEY of breast cancer at the Pennsylvania Hospital has shown that occasionally patients with recurrent and spreading breast cancer survive for many years.

The situation does not warrant a "let the patient die in peace" attitude, Drs. Charles K. Zug, III, and Charles H. Cretzmeyer Jr., told the American College of Surgeons sectional meeting in Philadelphia.

Favorable response to hormone treatment and other therapy is "sufficiently frequent to warrant an all-out therapeutic effort," the doctors said.

They cited ten cases of improvement to support their belief. Late recurrence of breast cancer is not uncommon, the doctors said. The cases recurred as late as 22, 23, and 19 years. Six-year, ten-year and 12-year survivals after recurrence were also reported.

Statistics presented on all cases of breast cancer seen over the 30-year-period included these:

The absolute five-year survival rate was 36%. The cure rate of patients treated by radical operations was 34%. For 229 patients treated in the last ten years, the five-year cure rate was 41% and for those treated by radical operation it was 49%. The cure rate for all patients without involvement of armpit swelling, or auxiliary nodes, was 51%, but this fell to 24% when such nodes were involved.

The term "cure" implies freedom from any evidence of breast cancer, whereas the term "survival" implies only that the patient is alive.

Twenty-one cases were reported of cancer in both breasts, but the investigators said they felt that the second tumor is usually the result of spreading from the first. Occasionally, however, they said two independent primary tumors occur.

• Science News Letter, 79:207 April 1, 1961

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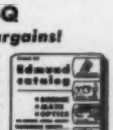

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WATER SKI INTERCOM is a tow rope and audio signaling system providing communication between boat pilot and skier. Clear beep signal may come from pilot by push-button on instrument panel or from skier using waterproof switch on tow bar handle. If skier loses grip on tow bar, alarm sounds instantly.

• Science News Letter, 79:208 April 1, 1961

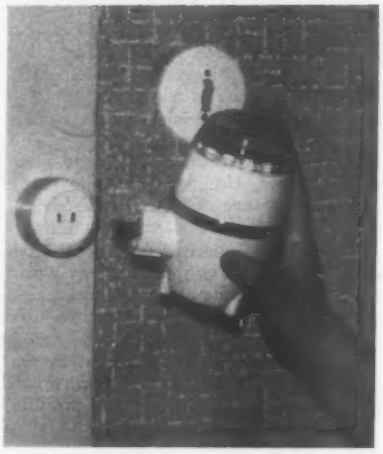
HI-FI SPEAKER SEMI-KIT takes less than an hour to assemble and provides listeners with unusually lifelike response throughout the range of 50 to 14,000 cps. It weighs 12 pounds and its dimensions are 15¼ by 9¼ by 8½ inches. Unit comes with assembly-instruction manual.

• Science News Letter, 79:208 April 1, 1961

PUBLIC ADDRESS UNIT built into a standard 12- by 18-inch attache case will reach an audience of 200 persons and give up to a year of normal service on one set of batteries. The case also has space for documents and a writing platform for use while traveling. Unit comes complete with lavalier microphone and 25 feet of cord.

• Science News Letter, 79:208 April 1, 1961

ELECTRIC COFFEE-GRINDER with built-in plug, shown in the photograph, can be plugged into any wall socket to grind enough coffee for 8 to 10 cups in 10 seconds. Available for 110 or 220 volts, the grinder



has a clear plastic, see-through cover. A press-button switch turns it off when the coffee is ground.

• Science News Letter, 79:208 April 1, 1961

ALUMINUM COATING protects aluminum, stainless steel and other nonferrous metals against acids, alkali and outdoor exposure. The coating is easily applied by dip, brush or spray and forms a nonyellowing, tough, glossy film that dries tack-free in two to three minutes at room temperature and 50% relative humidity.

• Science News Letter, 79:208 April 1, 1961

SEPTIC TANK GAUGE tells when septic tank needs cleaning. Electronic sensing unit is checked by the press of a button in the home. Manufacturer claims gauge will save money on needless premature cleaning as well as by warning of sewage problems.

• Science News Letter, 79:208 April 1, 1961

LUMINOUS CEILINGS for home use provide a soft, glare-free light. Types and designs of the vinyl plastic panels are virtually unlimited. Panels are lightweight, durable, easily cleaned and will not support combustion.

• Science News Letter, 79:208 April 1, 1961

MAGNETIC MATHBOARD provides visual mathematics instruction by means of white and black plastic geometric figures magnetized to the board. They can be manipulated to illustrate scores of mathematical functions. The three- by four-foot board is also a regular blackboard on which chalk can be used. It can be set on its easel or on chalk tray of classroom blackboard. Illustrated manual provides selection of demonstrations.

• Science News Letter, 79:208 April 1, 1961

Nature Ramblings

Grasshoppers

➤ THE WARMING-UP weeks soon will bring the insects out of their winter quarters very numerously, and none more so than the young grasshoppers.

When the frosts of last fall closed down on the land and their parents perished, their mothers did at least make provision for the perpetuation of the race by laying clusters of eggs in the soil in out-of-the-way corners and fallow fields.

So the young ones will emerge as tiny creatures, which entomologists have named "nymphs." "Imps" would seem a much more appropriate title.

However that may be, these grasshopper nymphs are immature, unfinished-looking things, with stubby wings that cannot yet be used for flying, but with appetites already perfectly developed. After they have cracked and shed their skins a few times, their wings will have grown to full size, and their appetites to a hundred percent plus.

One of the aims of the constant searching of government entomologists, those unrelenting enemies of insect pests, is to find a fungus disease or effective spraying program that will diminish the number of grasshoppers.

Last year concerted efforts of specialists and landowners knocked a million acres of grasshopper-plagued rangeland off the "heavily infested" list.

These voracious nibblers are now at their lowest ebb in years, and an all-out effort this spring could deal the grasshopper a telling blow.

• Science News Letter, 79:208 April 1, 1961

Do You Know?

Scientists have packaged susbtances in *capsules* one twenty-five-thousands of an inch in diameter, which is smaller than some bacteria.

There are twice as many *automobiles* in Los Angeles as in all South America.

There are about 250,000 *physicians* in the United States.

Money spent on building *homes* in the United States dropped $2.7 billion in 1960 from that spent in 1959.

A new chemical prevents *ice* from forming in aircraft jet fuel systems while flying at high altitudes.

The *birth* rate in the United States reaches a peak in the summer months of July, August and September, and in the winter month of December.

Nearly 11,350 persons died from *fires* in the United States during 1960.

• Science News Letter, 79:208 April 1, 1961